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the Association—was that of Professor Nef, on 'The Chemistry of Methylene,' only a portion of which, however, was read. The author, as a result of this and former work, claims among other things to have proved the existence of isomeric acetylenes, one of which is characterized by the presence of a bivalent carbon atom and should therefore be represented by the formula $=C:CH_2$. This substance and its derivatives are remarkable on account of their extraordinary instability, horrible odor and extremely poisonous properties—peculiarities shared in large measure by all compounds of bivalent carbon, among which the author includes the cyanides. By a continuation of the process of removing hydrogen, Professor Nef expects to isolate gaseous and liquid carbon, with molecular weights of 24 and 72, respectively! The publication of the full text of this remarkable paper will certainly be awaited with interest.

As the result of a careful research, Professor Freer brought forward further arguments in favor of the view advanced by Nef for the constitution of the aliphatic ketones and their metallic derivatives. Dr. Lehmann reported the production of benzene derivatives through the reduction of a 1:6 diketone formed by the condensation of benzil with two molecules of acetophenone. A paper on the 'Condensation-products of Aldehydes and Amides' was read by Dr. Kohn. A report of analyses of pre-carboniferous coals was presented by Professor W. H. Ellis.

Professor Roberts-Austen exhibited some photographs of the 'splash' produced by objects falling into molten metals, and intended to show the similarity of behavior in these and other liquids. Mr. Ramage explained a number of photographs of the spectra of minerals and metals, prepared by Professor Hartley and himself. Dr. W. L. Miller exhibited an apparatus designed to determine the vapor-tensions of liquid mix-

tures. Mr. W. L. T. Addison read a portion of an interesting paper on the formation of crystals. Short papers by Dr. Gladstone and Mr. Hibbert and by Dr. T. Waddell discussed the absorption of Röntgen rays by the light metals. The curious effects produced by certain metals upon a photographic plate when placed in contact with it, or even, in some cases, in its neighborhood, were discussed by Dr. W. J. Russell. In the mutual decomposition of hydrobromic and bromic acids, Professor James Walker finds an interesting case where the application of the theory of electrolytic dissociation furnishes a satisfactory explanation of the course taken by the reaction.

Two papers remain to be mentioned, that of Professor Andrews on 'Reform in the Teaching of Chemistry,' and that of Professor Meldola on 'The Rationale of Chemical Synthesis.' The latter was an attempt to find a common ground upon which the chemist and the physiologist could work, each along his own lines of research, and where, by united judicious effort, more rapid progress could be made into those mysterious regions now withholding from our eager quest so much of vast importance to mankind.

W. W. R.

GEOGRAPHY AT THE BRITISH ASSOCIATION.

THE geographers of the United States and Canada have every reason to feel highly pleased with the reception given them at the Toronto meeting of the British Association. Every effort was made to have the visiting geographers feel that their hosts considered them, not guests, but fellow-workers. Nearly one-half of the general committee was composed of residents of North America, and one day was given over to papers concerning Canada and the United States. In all, nearly half of the papers presented were by Americans.

The National Geographic Society, of Washington, D. C., had made especial efforts to have America well represented, and much is due to its efforts. It is, however, to be regretted that there were so many papers of an historical character dealing with the geographic results of the several government bureaus of the United States and Canada, and so few papers on the one branch of geography in which America has done the most in the last few years, namely, Physiography. The absence of many of our best physiographers on official field duties partly accounts for the scarcity of such communications.

The meeting of the Section opened most auspiciously with a goodly attendance at the address of the President, Dr. J. Scott Keltie, Secretary of the Royal Geographical Society, and editor of the *Geographical Journal and Statesmen's Year Book*. Dr. Keltie's careful summary of the geographical results to date, and his outline of possible future work, has already been published in several places, and needs no further comment. The listening American was impressed with the heartfelt compliments that the author paid to the works of several Americans, and to the various United States government bureaus.

In the afternoon of the first day Sir George Robertson gave a very interesting and entertaining account of Kafiristan and the Kafirs, and his life among them. Mr. E. G. Ravenstein reported in brief the results of the Committee on the Climatology of Africa. The committee is continued with a grant of £10 from the Association. The two following papers were brief abstracts of recent investigations of the Physiography and Temperature of Nova Zembla and Spitzbergen.

The second day of the meeting was to have been devoted to educational papers, but there were not enough to fill the program. The day opened with a short

paper by the writer on 'Scientific Geography for Schools,' a plea for the assistance of scientists in the planning and execution of geographical courses in schools for all grades. A brief summary was given by the President of the voluminous report of the Committee on Geographical Education, prepared by Mr. A. J. Herbertson. The Royal Geographical Society has within the last fourteen years accomplished a very great reform in geographical education, since the careful study of the conditions by Dr. Keltie brought attention to the matter. Other papers of the forenoon were by Lieutenant-Colonel Bailey, on 'Forestry in India.' Colonel Bailey gave a very interesting account of the present conditions of the forests and the methods of protection necessary, a paper that showed thorough familiarity with the subject at first hand. The indefatigable Recorder of the Section, Dr. Hugh R. Mill, who is also librarian of the Royal Geographical Society, presented a very thoughtful paper on the 'Classification of Geography,' based on the results of his labors in cataloguing. The last paper of the forenoon was by Mr. Vaughn Cornish, on the 'Distribution of Detritus by the Sea,' in which the author considered the ocean processes in much detail.

In the afternoon Professor John Milne, the seismologist, gave a very suggestive and interesting lecture on 'Certain Submarine Changes,' deduced from his study of earthquakes and the breaking of ocean cables. Professor Milne also gave a more popular and inclusive evening lecture before the whole Association, and other papers before the Geological Section, each of which presented many new thoughts of practical use to geologists and geographers. Mr. Ravenstein followed Professor Milne with a detailed account of the result of his studies concerning the Congo and the Cape of Good Hope from 1482 to 1488, and the first rounding of the Cape.

The third day was devoted to the geography of the United States and Canada, and the papers presented were mostly of a historical character, and included an account of the work of the various geographical institutions of the United States, by Marcus Baker; the Work of the United States Coast and Geodetic Survey, by Dr. T. C. Mendenhall; the Hydrography of the United States, by Mr. F. H. Newell; the Geographical Work of the United States Geological Survey, by Mr. C. D. Walcott; Geographical Work of the Canada Geological Survey, by Mr. C. J. White; the Work of the Canada Weather Bureau, by Mr. Stupart, and of the United States Weather Bureau, by Mr. Willis L. Moore.

Professor William M. Davis gave an account of the coastal plain of Maine. This paper epitomized the principles of the physiographic classification of land forms, and gave a careful account of the features of the coastal plain of Maine and its position in the classification, in spite of what appeared to be at first apparent anomalies. Mr. C. E. Lumsden entered a strong plea for the unification of time at sea, and showed the confusion arising from the present systems of time record employed by mariners. The paper of the day drawing the largest audience was that of the explorer and geographer, Dr. J. B. Tyrrell, who gave an interesting illustrated account of the Barren Lands of Canada. Some of the tales of game in this region of difficult traveling, though verified by the camera, were almost incredible.

The session of the fourth day, devoted to physical geography, opened with a large audience to greet the explorer and hunter, Mr. E. C. Selous, who gave a glowing account of the Economic Geography of Rhodesia, based on an intimate knowledge of about a quarter of a century. This paper added many data of value to those brought forth by the report of the Committee on

Climatology of Africa, and was full of interest because of the present political condition of South Africa. Other papers of the morning were: 'A Journey in Tripoli,' by J. T. Myres; 'On the Direction of Lines of Structure in Eurasia,' by Prince Kropotkin; 'Potamology as a Branch of Geography,' by Professor A. Penck, and the 'Geographical Development of the Lower Mississippi,' by E. L. Corthell, concerning which it is impossible, for lack of space, to make separate note. Suffice it to say that these papers were among the most scientific of the physical geography papers, and were all of value. The afternoon session was again devoted to North America, with papers on 'Southeastern Alaska,' by Otto J. Klotz; 'The First Ascent of Mt. Lefroy and Mt. Aberdeen,' by Professor H. B. Dixon, and 'Mexico Felix and Mexico Deserta,' by O. H. Howarth. Recent exploration was well represented by the paper on Mt. Lefroy and Mt. Aberdeen, as these peaks had just been scaled for the first time within a few weeks of the meeting.

The last day was devoted to a geographical round up, and could not be classified. The principal paper, read by General A. W. Greely, was 'The Growth and Material Conditions of the United States,' prepared by Mr. Henry Gannett. Professor W. M. Davis spoke on the importance of geography as a university subject.

Though these papers were the only ones that were presented in the Section of Geography, they were not the only geographic papers before the Association; other papers pertaining to physical and anthropological geography were given in different Sections. When we consider the geographic papers *in toto*, we see that the meeting was memorable for the new geographic material presented. New ideas of political or physical geography were not all, however, that the visiting geographers carried away from Toronto. The contact with the

best geographers from abroad was of very great value, particularly to many of the younger men. On every hand good fellowship prevailed, and every one present felt a new impulse to work from the inspiration of the meeting. Many of the visitors took the trip to the western coast after the meeting, on which, according to reports, fully as great results geographically were obtained as at the meeting. Not only must Canada feel a new scientific movement of progress from the meeting, but the United States as well must join in the good to be obtained. The visitors from abroad all agreed that they had gained much from the trip more helpful than mere information. All the Americans trust that they have been able to give in return a part of what they have received, and that this international meeting may help the cause of geography on on both sides of the water.

RICHARD E. DODGE.

IS THE DENVER FORMATION LACUSTRINE
OR FLUVIATILE?

THE usual interpretation of stratified deposits refers them to accumulation beneath water, either in the sea or in lakes. But many observers have recognized the ability of rivers to form stratified deposits more or less extensive; hence the mere occurrence of stratification might suggest fluvial as well as lacustrine or marine origin; and some other sign than stratification would be needed to distinguish among these several conditions of deposition. When fossils are contained in the strata it is commonly easy to determine at least whether they were of salt or fresh water origin; but when without fossils, or when containing only fresh water or land fossils, it may be still a question whether the deposits were formed in lakes or rivers. It has been perhaps assumed that river deposits must be local, while lacustrine deposits may be widespread; but the immense fluvial deposits

of the Indo-Gangetic plain must suffice to free the products of aggrading rivers from narrow bounds. Blandford's account of the vast deposits of waste in long sloping plains at the base of mountain ranges in the interior basins of Persia, as well as the description of similar accumulations in our western country, shows that extensive stratified deposits may be formed in regions where even rivers are not a constant or conspicuous agency; and the believer in the competency of small processes to produce great results if time enough is allowed would find it difficult to set limits to the area or thickness of formation of such origin.

The distinction between true lacustrine sediments and true fluvial sediments may be made in part by their composition and structure and in part by their fossils. River deposits are of variable sequence, coarse and fine, evenly or unevenly arranged, cross-bedded, ripple-marked and sun-cracked. Mid-lake deposits are of fine texture and even structure, becoming coarse and irregular only near their margin. A characteristic lacustrine fauna, enclosed in mid-lake silts, should be easily distinguished from the mixture of land and water fauna that might be preserved in coarser lake-border deposits or in the coarse and fine strata of normal river deposits. In the absence of a fauna, it might be difficult to distinguish lake-border deposits from river deposits; there might indeed be difficulty in separating lacustrine silts from the fine silts of river flood-plains, if fossils were wanting.

Gilbert's interpretation of some of the newer deposits on the Plains of Colorado near the Arkansas river as of fluvial origin, and the adoption of his idea by the geologists of Kansas for the eastward extension of the same formations, has recently given practical application to the above generalities. Penck gives in his *Morphologie* a number of European examples of deposits ordinarily called lacustrine, but which